Biological Diversity: The Greatest Miracle Known to Man

V.B. Sawarkar

October 23, 2008

Maharashtra Academy of Sciences

Workshop on Biodiversity: Conservation and Management

At

The National Chemical Laboratory, Pune

Our planet was born 4.5 billion years ago as a ball of fire, yet it was chosen to support life in millions of wondrous forms

Life emerged in water in unicellular form to pull the trick for manufacturing oxygen (that led to the formation of ozone) and using carbon dioxide for building biomass when the Earth was a billion years young!

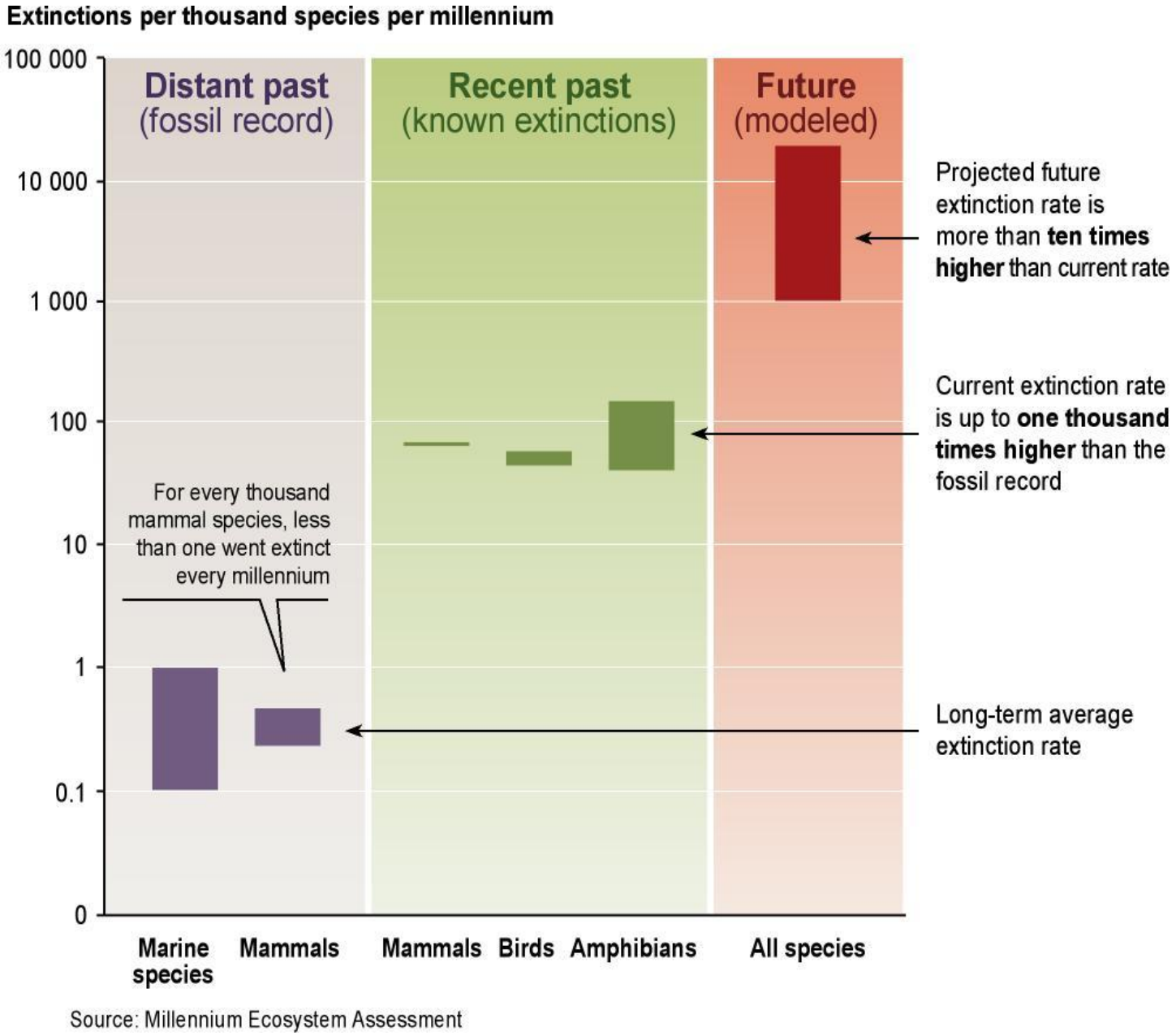
*Trees came into existence only between 360 to 270 million years ago

*The modern terrestrial and aquatic animals were born between 2 to 1.5 million years back

The modern tool using man arrived on the scene 50,000 years ago.

If the Earth's history till then is compressed to 365 days then……

The modern man arrived on December 31st, four minutes before the stroke of midnight!


Extinctions per thousand species per millennium
100 000
10 000
1 000
100
10
1
0.1
0
Distant past
(fossil record)
Recent past
(known extinctions)
Future
(modeled)
For every thousand mammal species, less than one went extinct every millennium
Projected future extinction rate is more than ten times higher than current rate
Current extinction rate is up to one thousand times higher than the fossil record
Long-term average extinction rate
Marine species
Mammals
Mammals
Birds
Amphibians
All species
Source: Millennium Ecosystem Assessment

“Darwin gave us the first glimpse of the origin of species. We know now what was unknown to all the preceding caravan of generations: that men are only fellow voyagers with other creatures in the odyssey of evolution. The new knowledge should have given us, by this time, a kinship with other fellow creatures; a wish to live and let live; a sense of wonder over the magnitude and duration of the biotic enterprise”

-----Aldo Leopold

The Diversity Of Habitats In India

*Range of elevation from sea level to >8000 meters above msl

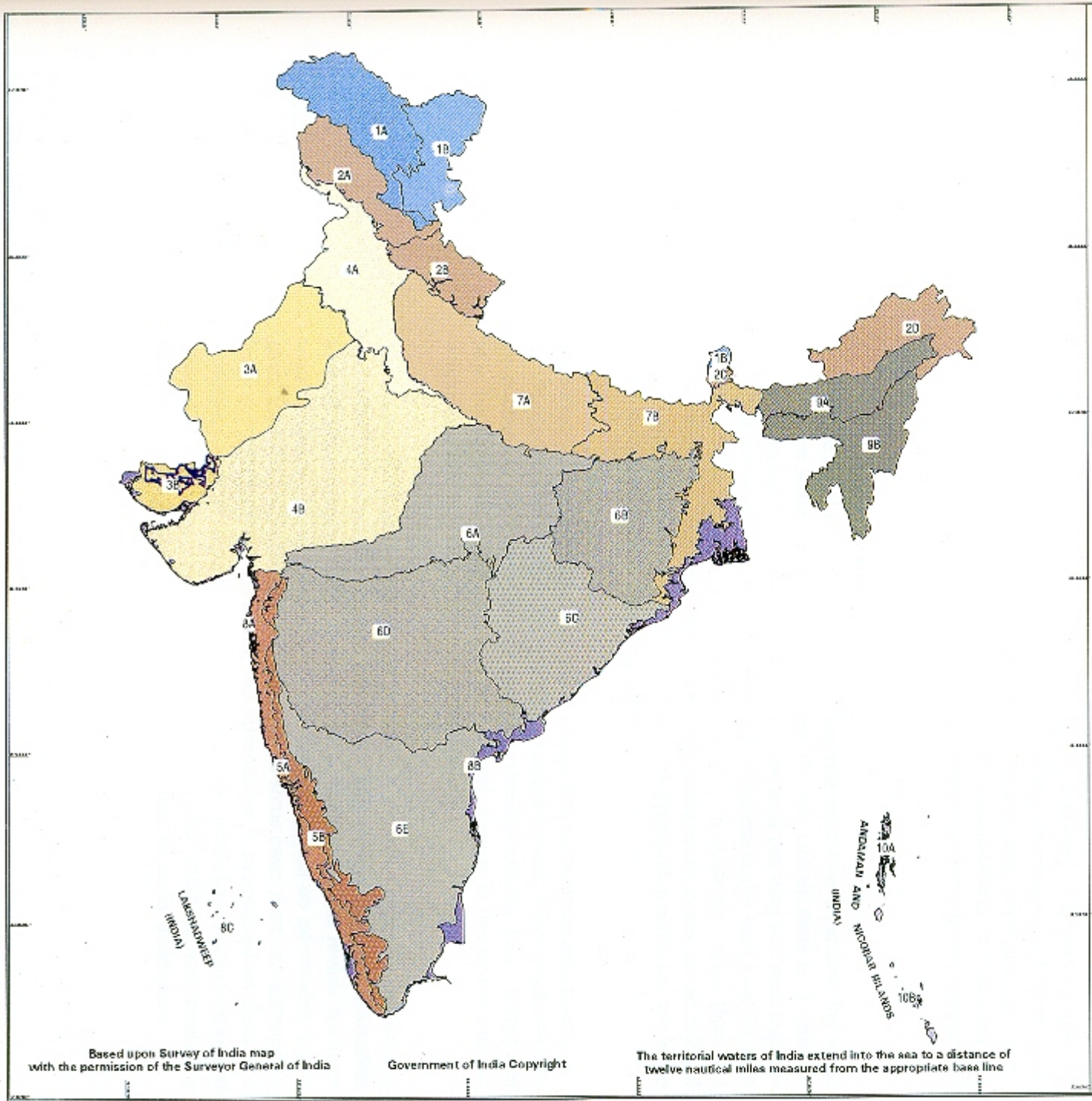
*Hot and cold deserts

*semi arid deciduous forests and dry scrub to evergreen rainforests, coniferous and mangrove forests.

*Arid to tall wet grasslands, bogs and alpine meadows
*>7000 km length of coasts
*Islands, coral reefs, estuarine and marine habitats
*>28000 km length of rivers, and inland wetlands

India is first in the world in establishing an applied biogeographic classification for the country with >600 Protected Areas established (>5% of the geographic area) on this basis

Fig. 4 Biogeographic Classification of India : Provinces



	% *
1A: Trans-Himalaya--Ladakh Mtns.	3.3
1B: Trans-Himalaya--Tibetan Plateau	2.3
2A: Himalaya--North-West Himalaya	2.1
2B: Himalaya--West Himalaya	1.6
2C: Himalaya--Central Himalaya	0.2
2D: Himalaya--East Himalaya	2.5
3A: Desert--Thar	5.4
3B: Desert--Katchchh	1.1
4A: Semi-Arid--Punjab Plains	3.7
4B: Semi-Arid--Gujarat Rajputana	12.9
5A: Western Ghats--Malabar Plains	2.0
5B: Western Ghats--Western Ghats Mtns.	2.0
6A: Deccan Peninsula--Central Highlands	7.3
6B: Deccan Peninsula--Chotta-Nagpur	5.4
6C: Deccan Peninsula--Eastern Highlands	6.3
6D: Deccan Peninsula--Central Plateau	12.5
6E: Deccan Peninsula--Deccan South	10.4
7A: Gangetic Plain--Upper Gangetic Plain	6.3
7B: Gangetic Plain--Lower Gangetic Plain	4.5
8A: Coasts--West Coast	0.6
8B: Coasts--East Coast	1.9
8C: Coasts--Lakshadweep	< 0.1
9A: North-East--Brahmaputra Valley	2.0
9B: North-East--North-East Hills	3.2
10A: Islands--Andamans	0.2
10B: Islands--Nicobars	0.1
Marine Influenced Area : 10440 sq.km	

*** Represents percentage of the total geographical area of India : 3287263 sq.km**

0 100 200 300 400 500 600 700 800 900 1000

Kilometers

भारतीय वन्यजीव संस्थान
Wildlife Institute of India
GIS Cell, 2002

Source : Rodgers, Panwar & Mathur (2002)

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line

Biodiversity has ordained…

*Maintenance of water flows, quantity and regime in rivers along 28000km of their length.
*Catchment security of the 4291 dams: irrigation 3990, multipurpose 129, hydropower 86, drinking water 86

*Soil and ground water security
*Flood control
*Biodiversity as feedstock for agricultural biotechnology
*Agricultural prosperity and food security-safety net against hunger and poverty

Health Care

*Edible products from 213 species of trees, 128 of shrubs, 116 herbs, many fungi

*8000 species of plants used in different systems of medicine and tribal cultures

*540 species of plants feature in herbal drugs

*At least 320 species of wild relatives of cultivated crops have originated in India

*Support base for livestock industry

Species Endemic to India

>5150 plants

44 mammals

42 birds

164 reptiles

121 amphibians

435 fishes

16214 insects

A survey conducted by 1700 biologists in 130 countries over a period of the last 5 years reveals that of the 5487 species of mammals world over, 25% face possible extinction. Includes 49 from India

A peek at India’s wild mammals

* No of species 397 (8.58% of the world)

*Listed under Red Data: 211 (2002)

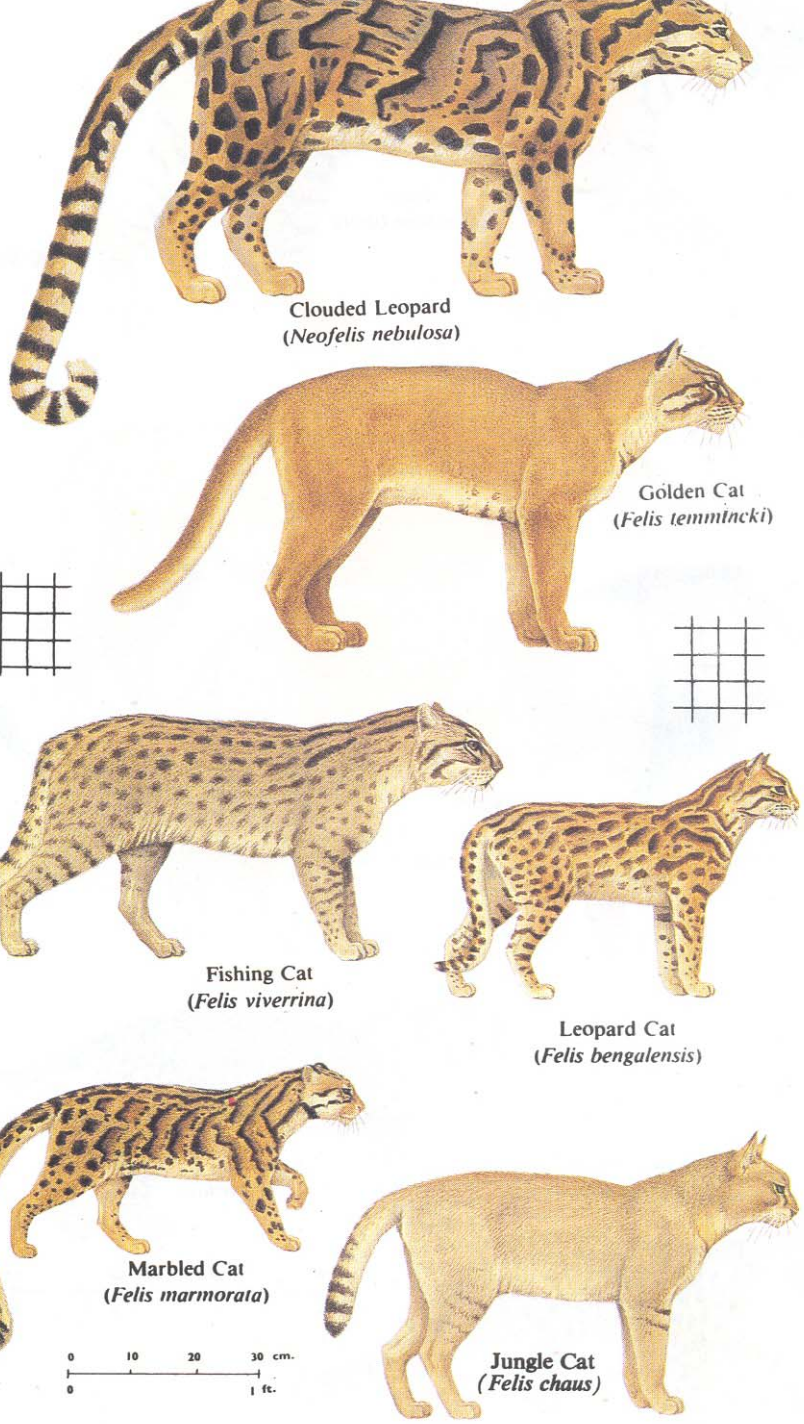
Critically endangered: 17

Endangered: 25

Vulnerable: 25

Near threatened: 42

Lower risk: 102


Clouded Leopard
(Neofelis nebulosa)
Golden Cat
(Felis temmincki)
Fishing Cat
(Felis viverrina)
Leopard Cat
(Felis bengalensis)
Marbled Cat
(Felis marmorata)
0 10 20 30 cm.
0 1 ft.
Jungle Cat
(Felis chaus)

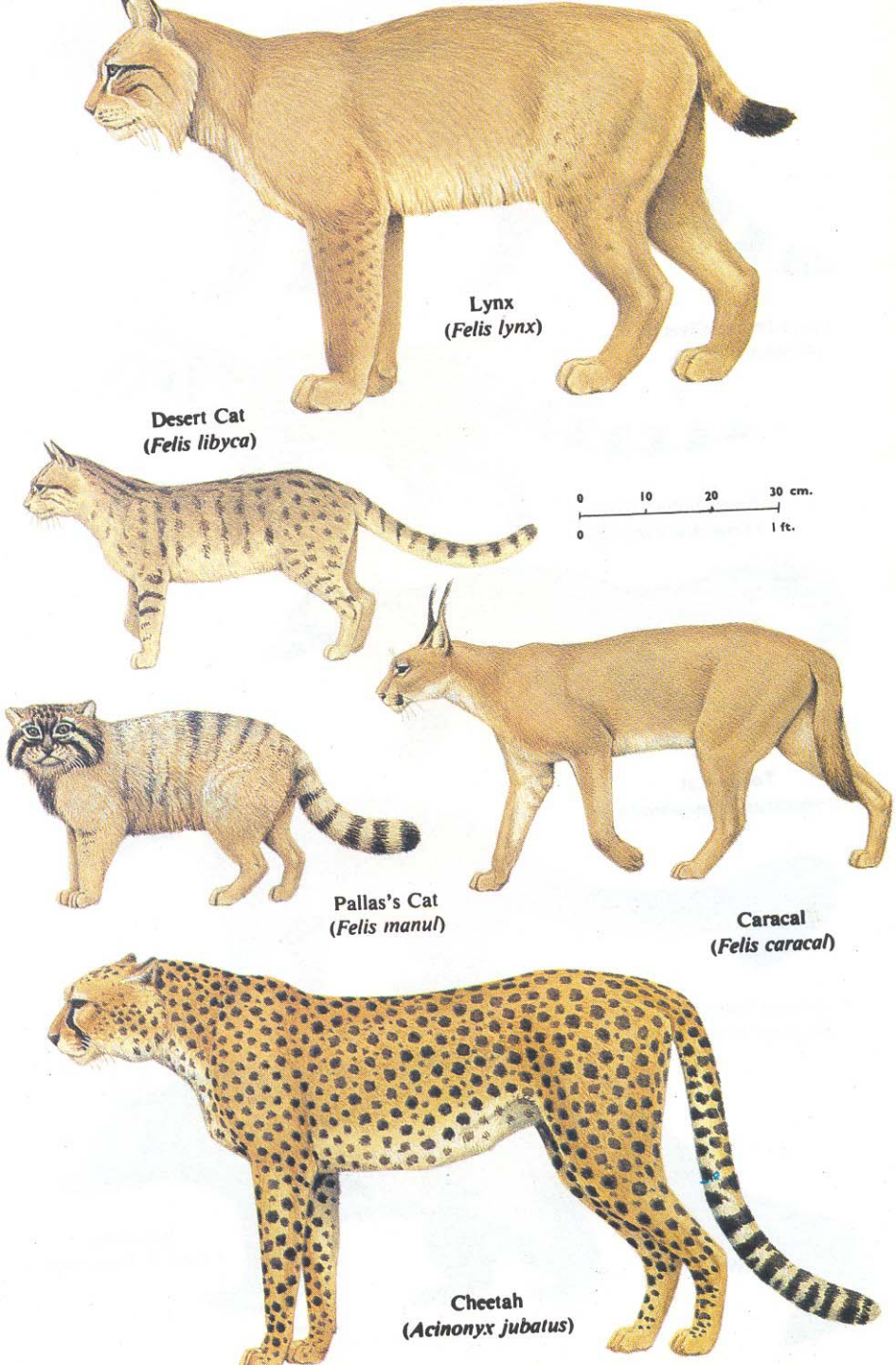
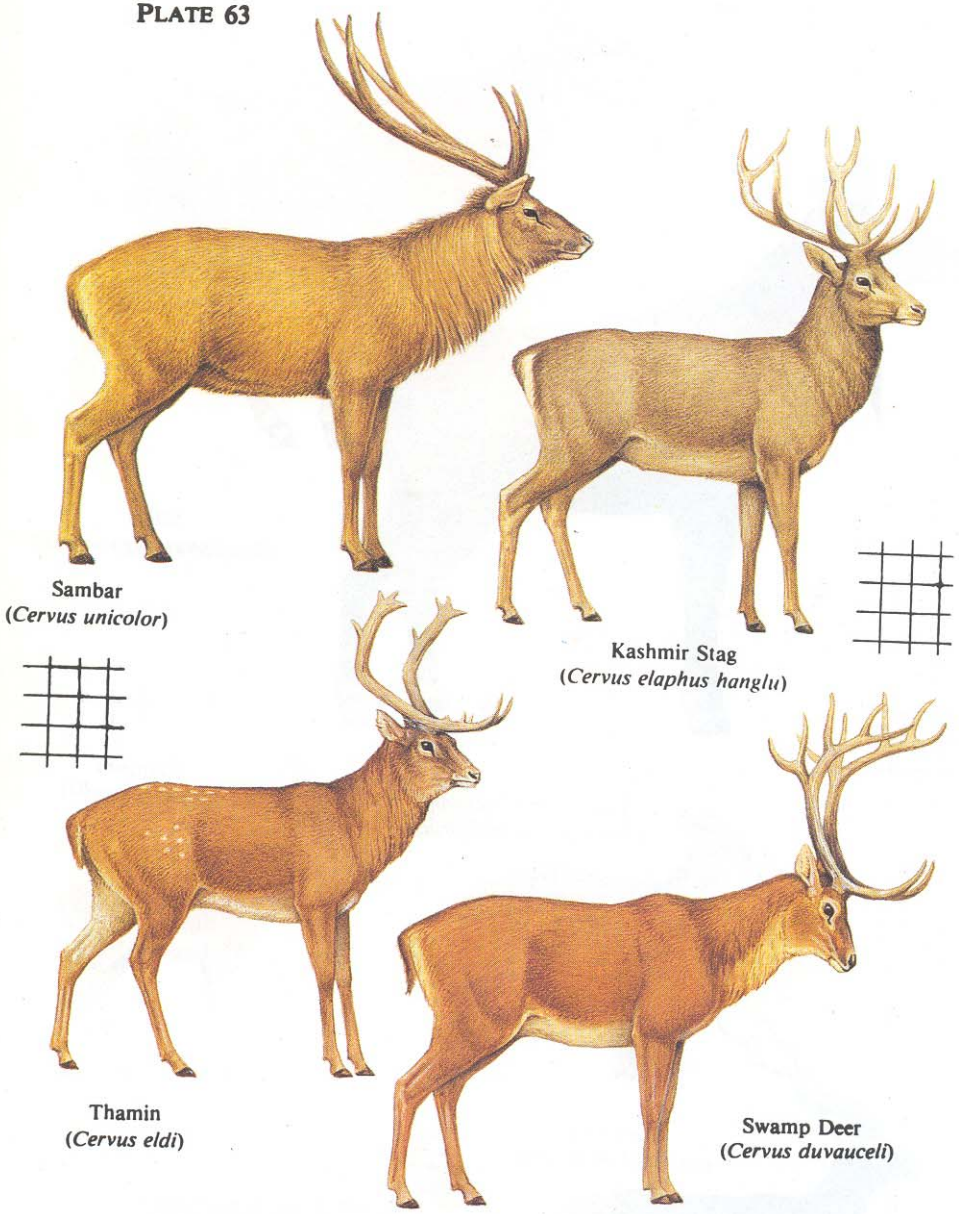

Lynx
(Felis lynx)
Desert Cat
(Felis libyca)
0 10 20 30 cm.
0 1 ft.
Pallas's Cat
(Felis manul)
Caracal
(Felis caracal)
Cheetah
(Acinonyx jubatus)

PLATE 63



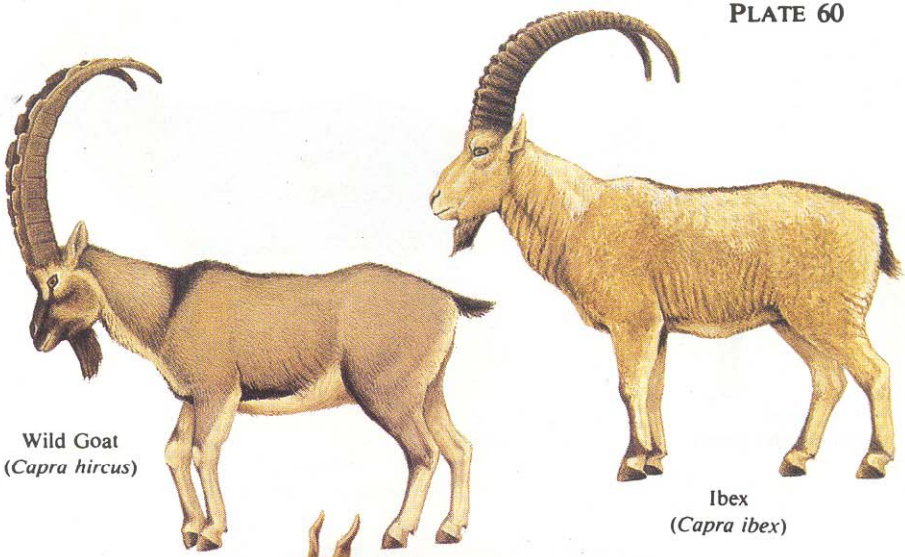
Sambar
(*Cervus unicolor*)

Kashmir Stag
(*Cervus elaphus hanglu*)

Thamin
(*Cervus eldi*)

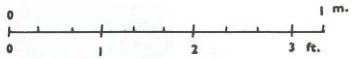
Swamp Deer
(*Cervus duvauceli*)

Chital
(*Axis axis*)



Wild Goat
(*Capra hircus*)

Ibex
(*Capra ibex*)

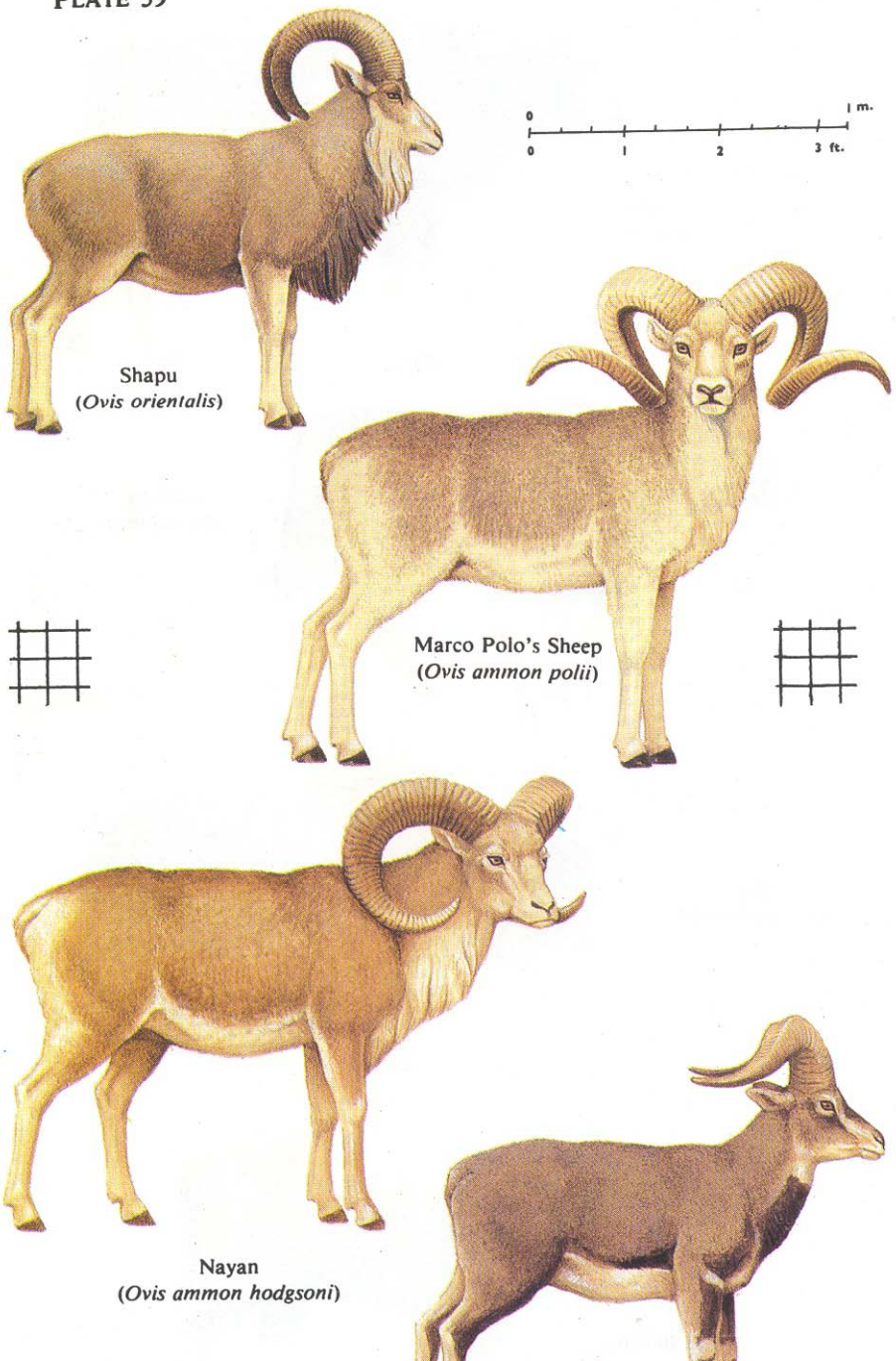


Markhor
(*Capra falconeri*)

Nilgiri Tahr
(*Hermitragus hylocrius*)

Himalayan Tahr
(*Hermitragus jemlahicus*)

PLATE 59

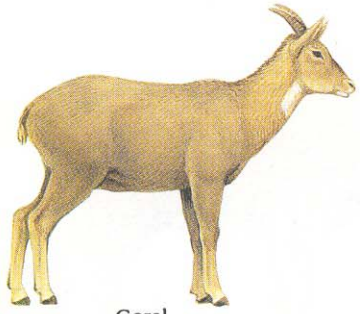


Shapu
(*Ovis orientalis*)

Marco Polo's Sheep
(*Ovis ammon polii*)

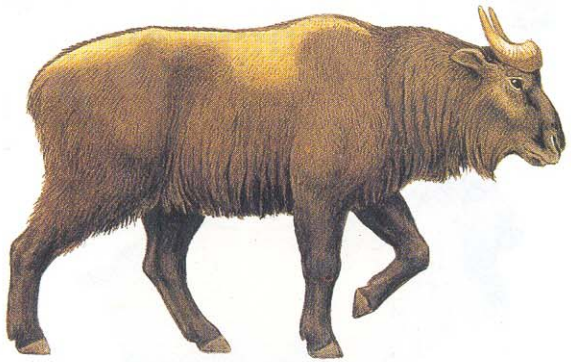
Nayan
(*Ovis ammon hodgsoni*)

PLATE 61

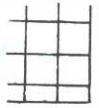


Goral
(*Nemorhaedus goral*)

Serow
(*Capricornis sumatraensis*)



Takin
(*Budorcas taxicolor*)

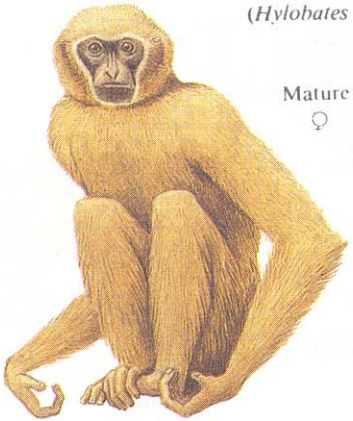


Tibetan Antelope
(*Pantholops hodgsoni*)

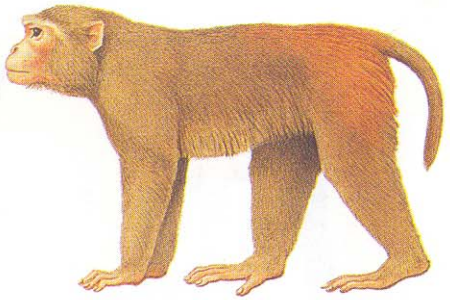
(*Hylobates hoolock*)

Mature ♀

♂ and young ♀



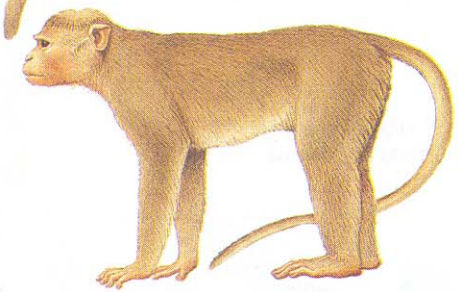
Liontailed Maca que
(*Macaca silenus*)



Assamese Macaque
(*Macaca assamensis*)

Rhesus Macaque
(*Macaca mulatta*)

Bonnet Macaque
(*Macaca radiata*)



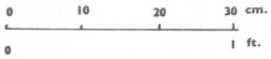
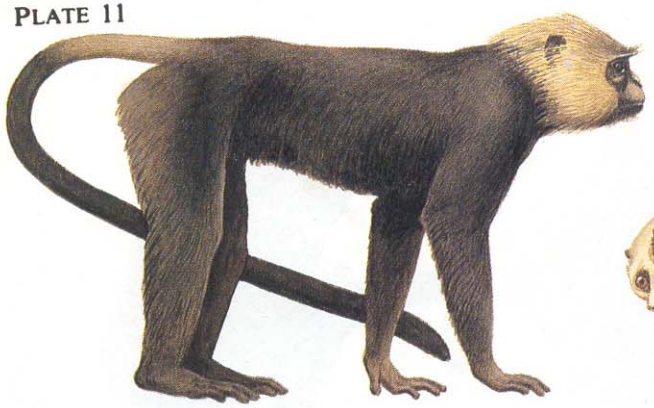
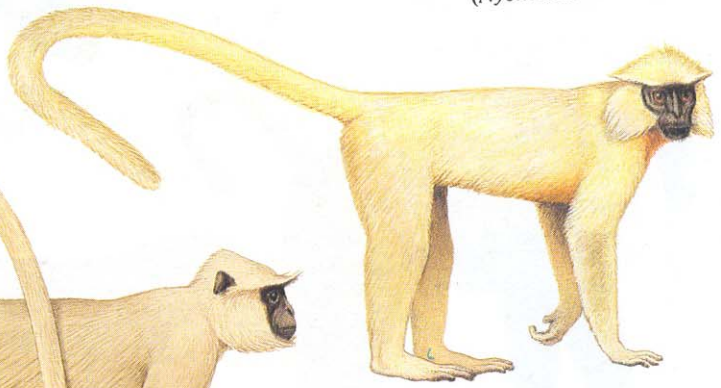


PLATE 11



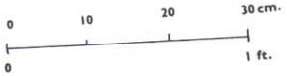
Nilgiri Langur
(*Presbytis johni*)

Slow Loris
(*Nycticebus coucang*)

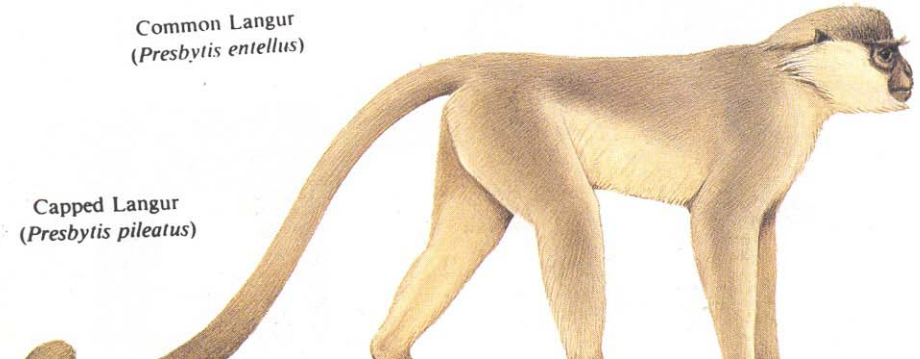


Golden Langur
(*Presbytis geei*)

Common Langur
(*Presbytis entellus*)



Capped Langur
(*Presbytis pileatus*)

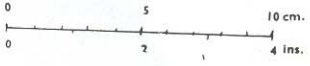


Kashmir Flying Squirrel
(*Hylopetes fimbriatus*)

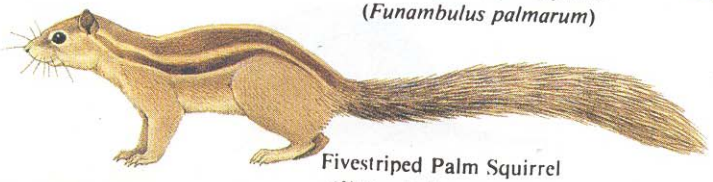
Particoloured Flying Squirrel
(*Hylopetes alboniger*)

Hoarybellied Himalayan Squirrel
(*Callosciurus pygerythrus*)

Orangebellied Himalayan Squirrel
(*Dremomys lokriah*)



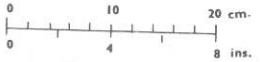
Threestriped Palm Squirrel
(*Funambulus palmarum*)



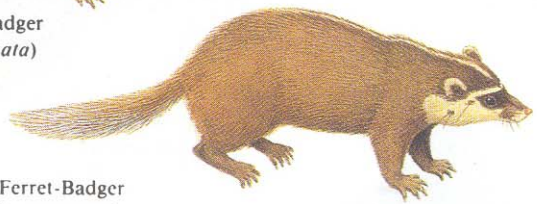
Fivestriped Palm Squirrel

PLATE 33

Marbled Polecat
(Vormela peregusna)



Chinese Ferret-Badger
(*Melogale moschata*)



Burmese Ferret-Badger
(*Melogale personata*)

Hog-Badger
(*Arctonyx collaris*)

*Out of the 77.4 million hectares of recorded forest in the country 37% are degraded.

*10 million hectares are under shifting cultivation.

*Between 1950 and 1980, annual average of 1,50,000 ha were diverted for a variety of purposes

Serious conflicts between man and wild animals on the rise

*Economic development antipodal to ecological tenets
*Agencies, government and non government have sectoral agenda
*Turf battles are routine
*Synergy eminently possible

Addressing the Growing Footprint of Green House Gases?

"..The last word in ignorance is the man who says of an animal or plant: 'What good is it?' If the land mechanism as a whole is good, then every part is good, whether we understand it or not. If the biota in the course of eons, has built something that we do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering"

….Aldo Leopold